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Aerospace Medicine

PREVENTION OF HEAT STRESS INJURIES

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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This instruction implements AFD 48-1, *Aerospace Medical Program*, and describes procedures designed to protect personnel, who are exposed to severe weather while performing duties at Osan Air Base (AB), from the adverse health effects from heat stress. This instruction applies to all personnel assigned, attached, or associated with the 51st Fighter Wing (FW).

1. References and Terms Explained: See [Attachment 1](#).

2. Concept:

2.1. This instruction provides unit commanders and supervisors with information and guidance to operate continuously in a severe hot environment. This instruction is to be applied in peacetime, contingency, and exercise operations.

2.2. This instruction provides guidance beyond that supplied in AFMAN 32-4005, *Personnel Protection and Attack Actions*.

3. Responsibilities:

3.1. 51st Aerospace Medicine Squadron, Bioenvironmental Engineering (51 AMDS/SGPB) will:

3.1.1. Establish recommended heat stress prevention work and rest cycles for personnel occupationally exposed to extreme temperature environments.

3.1.2. Conduct health risk assessments in workplaces at the request of the supervisor or commander.

3.1.3. Provide commanders and supervisors with risk assessments, upon request, for conducting tasks outside guidelines established in this instruction.

3.1.4. Conduct Wet Bulb Globe Temperature (WBGT) monitoring during May through October when ambient air temperature exceeds 85°F (or 29°C) and provide 51st Fighter Wing, Command Center (51 FW/OCO, 784-7000) with current WBGT index and heat stress conditions.

3.2. 51st Aerospace Medicine Squadron, Public Health Flight (51 AMDS/SGPM) will:

3.2.1. Provide assistance in educating workers on the adverse health effects of heat stress upon request or when needed.

3.3. 51st Operations Support Squadron, Weather Flight (51 OSS/OSW) will:

3.3.1. Update observed and forecast temperatures on Channel 10 and Weather Flight web page.

3.3.2. Be available 24 hour/day to answer any weather related questions.

3.4. 51st Fighter Wing, Command Center (51 FW/OCO) will:

3.4.1. Notify 51 FW Maintenance Operations Center (51 FW/OCM), group commanders, SODO, COMM MX CTRL, CE Desk, Red Horse, LE Desk, 731 AMCC and main fitness center of all appropriate heat stress categories. 51 FW/OCM will broadcast all appropriate heat stress categories to flightline production supervisors via the Land Mobile Radios (LMR).

3.4.2. Update heat stress categories on the Commander's Channel as needed.

3.5. Supervisors will:

3.5.1. Provide drinking water convenient to the work area during times where the heat condition is GREEN, YELLOW, BLUE, or BLACK.

3.5.2. Monitor workers for signs of heat stress and intervene when appropriate.

3.5.3. Ensure workers are trained on heat stress symptoms and prevention, and document the training in AF Form 55, **Employee Safety and Health Record**.

3.5.4. Implement work and rest cycles in accordance with [Attachment 2](#) of this instruction.

3.5.5. Ensure proper facilities are available for rest periods.

4. Heat Stress:

4.1. Controlling Heat Stress.

4.1.1. Follow the rest and work regime as specified in [Attachment 2](#) of this instruction.

4.1.2. During the hot season or when the worker is exposed to artificially generated heat, drinking water should be made available to the workers. Water should be kept reasonably cool, but not cold. Reference [Attachment 2](#) for recommended water intake. Urine should be clear and free of odor if proper hydration is occurring.

4.1.3. Personnel working in hot environments should be encouraged to salt their food. Do not take salt tablets unless directed by a physician.

4.1.4. Light, loose clothing made of breathable material should be worn during outdoor activities in hot conditions. If special clothing is required for performing a particular job and it impedes sweat evaporation or has a high insulation value (firefighters, chemical warfare), the workers' heat tolerance is reduced.

4.1.5. Acclimatization and Fitness:

4.1.5.1. Acclimatization to heat involves both physiological and psychological adjustments, which occur in an individual during the first week of exposure to a hot environment. Workers arriving from colder climates during the hot weather should be given light duty for the first week.

4.1.5.2. Workers who are not fit or have a medical condition may be more susceptible to the effects of extreme heat. If the member or the supervisor has any questions about fitness for duty in extreme heat, contact the member's physician.

4.2. Symptoms of Heat Related Conditions :

4.2.1. Heat Cramps. Symptoms include painful cramps of the voluntary muscles following exposure to heat. Heat cramps result primarily from excessive sweating which results in the loss of essential salts and water in the body. Body temperature is normal unless heat cramps are accompanied by heat exhaustion.

4.2.2. Heat Exhaustion. Symptoms of heat exhaustion include cool, clammy, moist skin, and profuse sweating. Breathing will usually become shallow and quiet, and the pulse rate will be weak. The pupils will remain normal.

4.2.3. Heat Stroke. Symptoms include extreme rise in body temperature, shivering, and lack of sweating. If continued for a period of time, it can result in kidney failure, pulmonary edema, and liver damage. A heat stroke is a severe medical emergency.

4.2.4. If any of the symptoms listed above persist after normal re-hydration procedures, seek medical advice and/or support immediately.

WILLIAM L. HOLLAND, Brigadier General, USAF
Comander, 51st Fighter Wing

Attachment 1

REFERENCES AND TERMS EXPLAINED:

A1.1. References:

A1.1.1. AFMAN 32-4005, *Personnel Protection and Attack Actions*, 1 March 1999.

A1.1.2. Heat Illness: A Handbook for Medical Officers, US Army Research Institute of Environmental Medicine Natick, MA, Report Number TN 91-3, 3 June 1991.

A1.1.3. Threshold Limit Values for Chemical Substances and Physical Agents, American Conference of Governmental Industrial Hygienists, 2000.

A1.1.4. TB MED 577/NAVMED P-5010-9

A1.2. Terms Explained:

A1.2.1. Ambient Temperature--The temperature of the air without regard to the effects of humidity, radiant heat of the sun, or wind.

A1.2.2. Heat Stress Condition--A four level advisory based on the risk of injury or illness due to the effects of working in extreme temperatures.

A1.2.2.1. Condition **GREEN**--The risk of heat-related injury or illness is real, but typical workloads can continue with proper hydration, clothing, and surveillance. All outdoor workers should have current training on the symptoms of overexposure and first aid measures. Implement work and rest cycles as appropriate.

A1.2.2.2. Condition **YELLOW**--The risk of heat-related injury or illness is significant. Work practices should be modified to properly manage the risks. Worker surveillance and education should be increased. Force hydration. Consider reassigning workers not acclimatized who are performing moderate and heavy tasks in hot environments to duties protected from extreme temperatures. Implement work and rest cycles as appropriate.

A1.2.2.3. Condition **BLUE**--The risk of heat-related injury or illness is high. Work practices must be modified to properly manage the risks. Workers should be monitored constantly and education should be conducted at least weekly. Reassign workers not acclimatized, who are performing moderate and heavy tasks in hot environments, to duties protected from extreme temperatures. Implement work and rest cycles as appropriate.

A1.2.2.4. Condition **BLACK**--The risk of heat-related injury or illness is severe. For heavy work in hot environments, only emergency and mission critical tasks should be conducted outdoors. Implement work and rest cycles as appropriate.

A1.2.3. Wet Bulb Globe Temperature (WBGT)--A method of measuring temperature to more accurately describe how the human body perceives the relative heat of an environment. It adjusts the ambient temperature for the effect of humidity, the cooling effect of evaporation, and the warming effect of the radiant heat from the sun. For the WBGT used at Osan AB, the following method will be used for determining the reading:

A1.2.3.1. $WBGT (^{\circ}F) = 0.7 \times \text{Natural Wet Bulb } (^{\circ}F) + 0.2 \times \text{Globe Temperature } (^{\circ}F) + 0.1 \times \text{Dry Bulb } (^{\circ}F).$

Attachment 2

HEAT STRESS PREVENTION RECOMMENDED WORK/REST CYCLES

Heat Category	WBGT Index (°F)	LIGHT WORK		MODERATE WORK		HEAVY WORK	
		Work/Rest (min/min)	Water Intake (Qt/hr)	Work/Rest (min/min)	Water Intake (Qt/hr)	Work/Rest (min/min)	Water Intake (Qt/hr)
1 (WHITE)	78 – 81.9	No Limit	½	No Limit	¾	40/20	¾
2 (GREEN)	82 – 84.9	No Limit	½	50/10	¾	30/30	1
3 (YELLOW)	85 – 87.9	No Limit	¾	40/20	¾	30/30	1
4 (BLUE)	88 – 89.9	No Limit	¾	30/30	¾	20/40	1
5 (BLACK)	> 90	50/10	1	20/40	1	10/50	1
NOTES				EXAMPLES OF WORK LOAD CATEGORIES		MOPP/IPE AND CLOTHING ADJUSTMENTS	
<p>* Work/rest cycle recommendations are based on personnel who are fully acclimatized, optimally conditioned, hydrated, and rested.</p> <p>* Rest means minimal physical activity (sitting or standing) and should be accomplished in the shade if possible.</p> <p>* Drink small amounts of water throughout the work period, not all at once.</p> <p>* WBGT is NOT air temperature. WBGT (outdoors) = {0.7 Natural Wet-Bulb + 0.2 Globe Temp. + 0.1 Dry-bulb}</p> <p>* References: TB MED 577/NAVMED P-5010-9 and AFMAN 32-4005.</p>				<p>Light: Standing or sitting to control machines, performing light hand or arm work</p> <p>Moderate: Cleaning floor, hammering nails, walking with moderate lifting</p> <p>Heavy: Pick and shovel work, digging ditches, sandbags filling and moving</p>		<p>MOPP 2 and MOPP 4: Add 10°F to the WBGT index</p> <p>IPE (flag jacket/helmet) Only: Add 5°F to the WBGT index</p> <p>Cotton Coveralls: Add 2°F to the WBGT index</p>	

Bioenvironmental Engineering performs WBGT measurement at least every hour when outside air temperature reaches 85 °F. WBGT index is reported to Weather Flight (784-4377) and Command Center (784-7000) for basewide dissemination. For further information, please call us at 784-2623.